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A New *Helminthoglypta* (*Rothelix*) (Gastropoda: Pulmonata: Helminthoglyptidae) from Warner Springs, San Diego County, California

by

RICHARD L. REEDER

Faculty of Biological Science, University of Tulsa, Tulsa, Oklahoma 74104, U.S.A.

AND

WALTER B. MILLER

Department of Ecology and Evolutionary Biology, The University of Arizona, Tucson, Arizona 85721, U.S.A.

Abstract. A new species of land snail, *Helminthoglypta* (*Rothelix*) ***warnerfontis,*** is described and its relationships within the subgenus *Rothelix* are described.

INTRODUCTION

This paper on a new *Helminthoglypta* is part of our continuing investigations of members of this genus in San Diego County and elsewhere in southern California (Miller, 1985; Reeder, 1986; Reeder & Miller, 1986a, b, 1987). We have relied heavily on material collected by the late Wendell O. Gregg as well as several personal collections in the Warner Springs area over the last 27 years.

Helminthoglypta (*Rothelix*) ***warnerfontis*** Reeder & Miller, sp. nov.

(Figures 1–4)

Diagnosis: A medium-sized, sub-globose *Helminthoglypta* (*Rothelix*) with a densely papillose shell and an open umbilicus; with penial sheath enveloping only the anterior chamber of lower part of penis and combined length of vagina and oviduct nearly equal to that of the lower part of the penis.

Description of shell of holotype: Shell (Figures 2–4) of moderate size, depressed, with conic spire, umbilicate, the umbilicus contained about 9.5 times in the diameter of the shell. Color tan to brown with a thin reddish-brown band on the rounded shoulder. Aperture ovate-lunate with peristome thickened, reflected moderately, and expanded only slightly at its columellar junction. Embryonic shell of 1¾ whorls, finely granulose. Postembryonic whorls with radial growth wrinkles and densely papillose with minute, evenly spaced papillae extending on to the base of the shell and into the umbilicus. Penultimate and body whorls with spirally arranged incised lines which are present both above and, more weakly, below the shoulder of the body whorl. Diameter 19.0 mm, height 11.4 mm, umbilicus 2.5 mm, number of whorls 6¼.

Reproductive anatomy of holotype: The genitalia (Figure 1) are typical of the subgenus, with a long, spacious atrial sac having a small dart sac at its proximal end and having two mucous glands with mucous bulbs, the ducts of which unite before entering the proximal end of the atrial sac. The vagina opens into the atrial sac at the proximal end. The spermatheca is spherical with a long duct having a spermathecal diverticulum diverging at a point approximately one-third of the way along the duct above its junction with the vagina. The penis has upper and lower divisions, the upper part of the penis being a shorter, narrow, double-walled tube. The lower part is single-tubed with a long, sausage-shaped anterior chamber and a shorter posterior chamber, the latter set off sharply from the anterior region by a venturi-like constriction and tapering sharply to its junction with the upper penis. A prominent connective tissue band unites the vas deferens

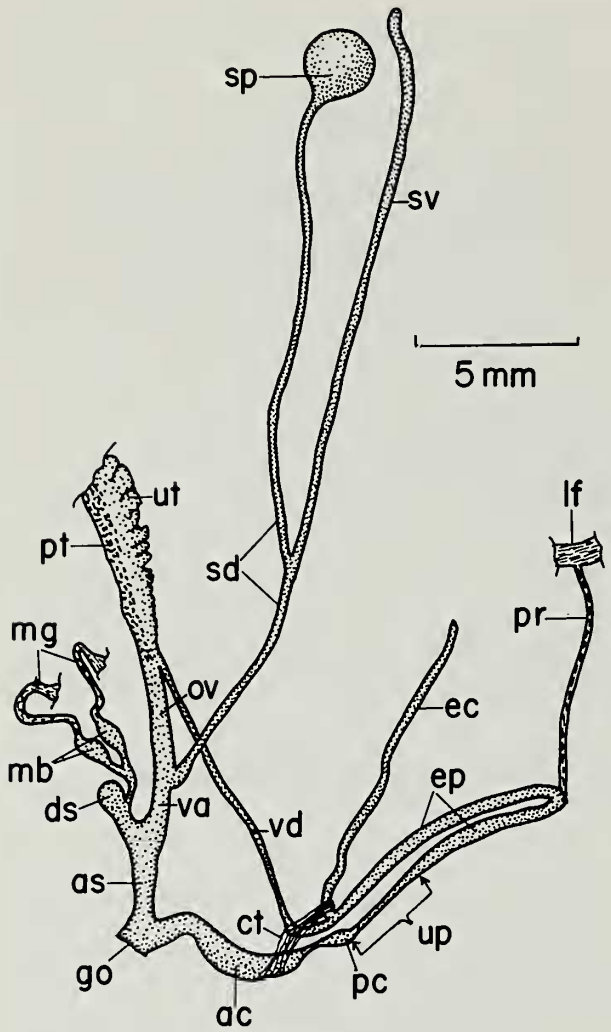

Figure 1

Anterior portion of reproductive system of holotype of *Helminthoglypta* (*Rothelix*) ***warnerfontis*** Reeder & Miller, sp. nov. Drawing prepared from projection of stained whole mount, WBM 6032, collected 23 Nov. 1972 at the type locality; arrows indicate limits of double-tubed upper part of the penis. ac, anterior chamber of lower part of penis; as, atrial sac; ct, connective tissue binding penis to vas deferens; ds, dart sac; ec, epiphallic caecum; ep, epiphallus; go, genital orifice; lf, portion of lung floor to which penial retractor attaches; mb, mucus bulbs; mg, initial portion of mucus gland membranes; ov, oviduct; pc, posterior chamber of lower part of penis; pr, penial retractor muscle; pt, prostate; sd, spermathecal duct; sp, spermatheca; sv, spermathecal diverticulum; up, upper part of penis; ut, uterus; va, vagina; vd, vas deferens.

with the upper portion of the anterior chamber of the lower penis. The epiphallus is of moderate length with a short epiphallic caecum. The penial retractor muscle attaches to the epiphallus. Measurements of anatomical structures are as follows:

Penis	9.64 mm
Epiphallus	12.9 mm
Epiphallic caecum	10.4 mm
Spermathecal duct	22.4 mm
Spermathecal diverticulum	17.5 mm
Vagina and oviduct combined	5.3 mm

Variations in paratypes: A total of 34 adult shells and 35 immatures was examined. Of 32 measurable adults the largest was 19.5 mm in diameter and 10.5 mm in height and the smallest measured 14.9 mm in diameter and 9.5 mm in height. All of the shells exhibited the radial growth lines and the characteristic densely papillose condition. Twelve adults and 15 immatures exhibited the spirally arranged incised lines.

Disposition of types: Holotype: Santa Barbara Museum of Natural History no. 34943. Paratypes: The Academy of Natural Sciences of Philadelphia no. 368246; U.S. National Museum no. 860400; W. B. Miller collection nos. 3794, 4307, and 6032; R. L. Reeder collection no. 716.

Type locality: San Diego County, California: in wood rat nests in Cañada Agua Caliente along south side of California State Highway 79, adjacent to golf course, about 1.6 km west of post office and fire station buildings in Warner Springs; 33°17.1'N, 116°39.2'W; elev. ca. 900 m (2950 ft); collected 31 Jan. 1960 (W. B. Miller and W. O. Gregg), 20 May 1962 (W. B. Miller and W. O. Gregg), 23 Nov. 1972 (W. B. Miller and R. L. Reeder) and 4 March 1985 (W. B. Miller, R. L. Reeder, and H. L. Fairbanks).

Discussion: There are now four known species of *Helminthoglypta* in the subgenus *Rothelix* Miller, 1985: *H.* (*R.*) *lowei* (Bartsch, 1918) (type species), *H.* (*R.*) *cuyamacensis* (Bartsch, 1916), *H.* (*R.*) *rhodophila* Reeder & Miller, 1987, and *H.* (*R.*) ***warnerfontis*** described above. All possess the characteristic penial features of *Rothelix,* namely a short and thin, double-tubed, upper part of the penis and a long and large lower part of the penis composed of a small posterior chamber connected to a capacious, sausage-shaped, anterior chamber by a very narrow venturi-shaped constriction. Additionally, the lower part of the penis is surrounded by a tough connective tissue which acts as a virtual penial sheath and binds it by numerous tissue threads to the vas deferens at its junction with the epiphallus. In *H. cuyamacensis* and *H. rhodophila,* this penial sheath completely envelops all of the posterior and anterior chambers whereas in *H. lowei* and *H.* ***warnerfontis*** it envelops only a part of the anterior chamber, leaving the posterior chamber and the venturi connection completely free. This characteristic is consistent in all adult specimens dissected (4 *H. cuyamacensis,* 5 *H. lowei,* 12 *H. rhodophila,* and 11 *H.* ***warnerfontis***). Accordingly, it provides a reliable diagnostic feature. Anatomically, therefore, *H.* ***warnerfontis*** appears to be most closely related to *H. lowei,* sharing similar penial characters. It differs from *H. lowei,* however, in that the female structures are proportionally larger. In *H. lowei,* the combined lengths of the vagina and oviduct are strikingly small, only about one-

Explanation of Figures 2 to 4

Helminthoglypta ***warnerfontis*** Reeder & Miller, sp. nov. Shell of holotype, SBMNH 34943; diameter 19.0 mm. Figure 2. Aperture view. Figure 3. Apical view. Figure 4. Umbilical view.

half the length of the lower part of the penis while in *H.* ***warnerfontis*** they are as long as the lower part of the penis. *Helminthoglypta* ***warnerfontis*** also differs from *H. lowei* in that it is a much smaller snail. The shell diameter of *H. lowei* ranged from 26.7 mm to 23.8 mm in 13 adult shells examined, with a mean of 24.3 mm, well above the largest specimen of *H.* ***warnerfontis***, which is 19.5 mm in diameter.

Distribution and habitat: In 1957 and 1972, *Helminthoglypta* ***warnerfontis*** was found widely and abundantly scattered in numerous wood rat nests along Cañada Agua Caliente below Warner Springs. Shortly thereafter, however, with the advent of golf courses and human population pressure, the area was "cleaned up" and rat nests became hard to find; with their disappearance the snails also became scarce. In March 1985, we revisited the area and after considerable searching, we came up with only one dead subadult shell and one live immature. It is apparent that this population is nearing extinction. Fortunately, we found another population, albeit in a small restricted area, along the ravine just below Lost Valley Spring (33°20.7'N, 116°38.1'W), approximately 8 km (5 miles) due north of Cañada Agua Caliente, in logs and leaf mold of *Quercus agrifolia*. Snails from this population are indistinguishable from specimens from Cañada Agua Caliente; they are considered to be conspecific. Since Lost Valley Spring is in the Cleveland National Forest, it is hoped that this species may continue to survive in relative protection.

Etymology: This species was known for many years to S. S. Berry and W. O. Gregg as "the Warner Spring snail." Gregg deferred to Berry, who always intended to describe it, but ultimately ran out of time. We are pleased to con-

tinue the use of their name, substituting the Latin *fontis* (genitive of *fons*) for spring.

ACKNOWLEDGMENTS

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